

## CLAIMS

What is claimed is:

1. A process for fabricating a semiconductor device, comprising:  
5       applying an immersion lithography medium to a surface of a semiconductor wafer;  
      exposing a material on the surface of the semiconductor wafer to  
      electromagnetic radiation having a selected wavelength; and  
      applying supercritical carbon dioxide to the semiconductor wafer to remove  
10       the immersion lithography medium from the surface of the semiconductor wafer.
2. A process as in claim 1 wherein the immersion lithography medium is  
      a fluoropolymer.
- 15       3. A process as in claim 1 wherein the immersion lithography medium is  
      substantially non-reactive with the material forming the surface of the semiconductor  
      wafer and is substantially transparent to the radiation.
4. A process as in claim 1 wherein the selected wavelength is in a range  
20       from about 11 nm to about 400 nm.
5. A process as in claim 1 wherein the selected wavelength is about 157  
      nm.
- 25       6. A process as in claim 1 wherein the material forming the surface of the  
      semiconductor wafer is photosensitive to the selected wavelength.
7. A process as in claim 1 further comprising, following the step of  
      applying supercritical carbon dioxide to the wafer, obtaining a mixture of the

immersion lithography medium removed from the surface and carbon dioxide and recovering the immersion lithography medium from the mixture.

5           8.       A process as in claim 7, wherein recovering includes reducing pressure and/or temperature of the mixture and removing carbon dioxide from the mixture.

          9.       A process as in claim 1, wherein exposing comprises passing the radiation through the immersion lithography medium.

10           10.      A process for fabricating a semiconductor device, comprising:  
applying an immersion lithography medium to a surface of a semiconductor wafer;  
exposing a material on the surface of the semiconductor wafer to  
electromagnetic radiation having a wavelength of about 157 nm, the exposing  
15           comprising passing the radiation through the immersion lithography medium; and  
applying supercritical carbon dioxide to the semiconductor wafer to remove  
the immersion lithography medium from the surface of the semiconductor wafer.

20           11.      A process as in claim 10 wherein the immersion lithography medium is a fluoropolymer.

          12.      A process as in claim 10 wherein the immersion lithography medium is substantially non-reactive with the material forming the surface of the semiconductor wafer and is substantially transparent to the radiation.

25           13.      A process as in claim 10 wherein the material forming the surface of the semiconductor wafer is photosensitive to the selected wavelength.

30           14.      A process as in claim 10 further comprising, following the step of applying supercritical carbon dioxide to the wafer, obtaining a mixture of the

immersion lithography medium removed from the surface and carbon dioxide and recovering the immersion lithography medium from the mixture.

5           15.     A process as in claim 14, wherein recovering includes reducing pressure and/or temperature of the mixture and removing carbon dioxide from the mixture.

10           16.     A process for fabricating a semiconductor device, comprising:  
applying an immersion lithography medium to a surface of a semiconductor wafer, wherein the immersion lithography medium is substantially non-reactive with the material forming the surface of the semiconductor wafer and is substantially transparent to the radiation;

15                 exposing a material on the surface of the semiconductor wafer to electromagnetic radiation having a wavelength of about 157 nm, the exposing comprising passing the radiation through the immersion lithography medium;

               applying supercritical carbon dioxide to the semiconductor wafer to remove the immersion lithography medium from the surface of the semiconductor wafer; and

20                 obtaining a mixture of the immersion lithography medium removed from the surface and carbon dioxide and recovering the immersion lithography medium from the mixture.

               17.     A process as in claim 16 wherein the immersion lithography medium is a fluoropolymer.

25           18.     A process as in claim 16 wherein the material forming the surface of the semiconductor wafer is photosensitive to the radiation.

30           19.     A process as in claim 16, wherein recovering includes reducing pressure and/or temperature of the mixture and removing carbon dioxide from the mixture.

20. A process as in claim 16, wherein the immersion lithography medium recovered from the mixture exhibits substantially the same chemical composition and/or substantially the same purity as the immersion lithography medium applied to a surface of the semiconductor wafer.